

Food Webs

5th Grade

Kelley Dunbar, Mr. Bellamy and Mrs. Cargle

References: (Checked 1/2005)

- http://www.lalc.k12.ca.us/uclasp/urban_science/food_chains/breeding.htm

Benchmarks:

SLC 14: Trace the transmission of energy in a small, simple ecosystem and/or identify the roles of organisms in the energy movement in an ecosystem.

Benchmarks: Students will identify the roles of organisms in a food chain/web.

SLC 1: Use a simple key to classify objects, organisms and/or phenomena.

SLC 9: Provide examples of transformation and/or conservation of matter and energy in simple physical systems.

Objectives:

The students will advance their knowledge of food chains to understanding the food pyramid, which describes the energy relationship between each trophic level (i.e. from producer to primary, secondary, tertiary, top consumer). As well, they will expand their simple food chain from the previous lesson into a more complex food web.

Materials:

- yarn
- animal name-cards (from the above reference website)
- colored construction paper

Initial Demonstration:

Ask the students to describe a typical afternoon—from lunch to dinner. Write their activities/behaviors on the board. You may want to direct them a little by asking leading questions. For example, if they play outside, do they get hot? Might they use the bathroom (they may be shy to offer this “activity”)? Discuss these activities and how they all require a transfer of energy. Last quarter the students learned that energy is conserved. This means it can’t be created out of nothing and it can’t just disappear. We gain energy by eating food; then what happens? Some of it is immediately lost just through the process of chewing and digestion. Some is discarded as waste. Only a relatively small amount is actually useful to us. As we exercise, we rid ourselves of some of this useful energy as heat. The rest helps us build stronger bodies.

All organisms have a similar system of energy intake and use. Now, suppose a deer is eaten by a bear. Is all the energy the deer took in from its last meal transferred to the bear? No.

A lot of it was lost and/or discarded as waste before the bear came along. This is true at all levels of the food chain. Another way of representing a food chain is through a food pyramid, which shows the energy relationship from one trophic level to another. With each successive link in the chain, only 10% of the previous energy is transferred.

Target Observation:

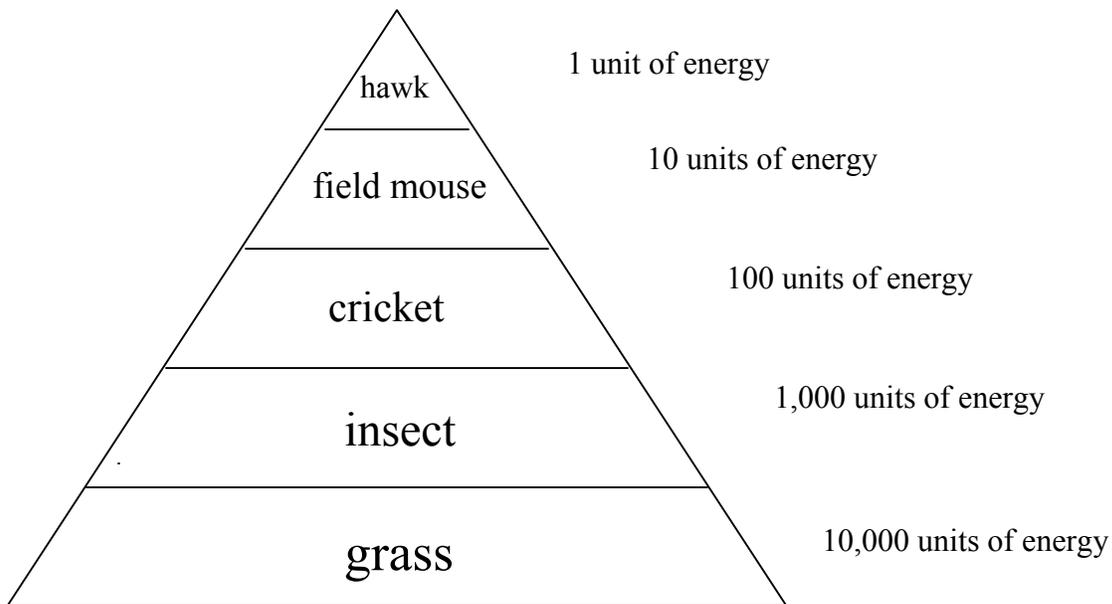
- Each step up the food chain involves a loss of energy.

Target Model:

- Food chains can also be modeled as energy pyramids, with each successive step gaining only 10% of the energy from the previous step.

Procedure: (Revised from the reference listed above)

Draw an energy pyramid on the board using the food chain from the previous day and include the energy intake of each level, relative to the one below it:



Discuss with the students how this model supports some peoples' beliefs in vegetarianism. It is certainly more energy-efficient! However, there are many good reasons to remain omnivorous. For example, we need the protein provided by red meats. It is also important to have variety because different foods offer us different nutritional value. In fact, our food chain is not really representative of a true ecosystem. What we need is to create a food web.

Pass out the animal name cards to the students. Give the sun the ball of yarn. Review with the students that the Sun is the source of all energy on Earth. Ask the student portraying the

Sun to whom he or she would throw the ball of yarn to begin the food chain (producer). The Sun holds onto the end of the yarn and tosses the ball of yarn to a student holding the name of a plant. Ask the students why the first step of the food chain is always a plant. Now ask the “plant” who should get the ball of yarn next (herbivore or carnivore). Have the plant toss the ball of yarn to a student holding the name card of a plant-eating animal. Be sure the "plant" holds onto the yarn before tossing the ball. The plant eater now looks around for something that eats it, and tosses the yarn to that animal (carnivore or omnivore).

The game progresses as each member of the food chain takes a turn while holding onto the yarn. The sequence stops at the top of the food chain with a predator that has no enemies, such as a hawk. Snip off the yarn and give the ball back to the Sun. Start the sequence again. Those who participated before can have another turn, thereby illustrating the growth of a food web. An animal usually has more than one source of food. For example, a bird can eat seeds and insects; or a hawk can eat a rabbit or snake. The coyote and opossum eat nearly everything—plants, animals, and human foods.

Talk to the students about the web they just created. What number/type of options did each person have when choosing its predator? (More than one? Herbivore, omnivore, carnivore?) What happens if one of the species in the web is removed? (Some animals may be able to adapt by preying on other sources of food, while other species on a more strict diet may starve.)

Target Observations:

- There are many different ways for energy to travel to get to the top of the food chain.
- The energy goes through many different organisms before it ends up in a predator like a hawk.

Target Revised Model:

- Food webs more accurately depict the numerous predator/prey interactions between consumers in nature.
- Each link in the web is very important. The loss of a single element can greatly impact all organisms higher up.

Summary:

The students have progressed from food chains to food webs and have an understanding of the interrelatedness of the organisms in the web.

***As an alternative, you might also try this:**

Break the students into pairs and have each pair come up with a four-to-five link food chain. Once you've checked a group's chain for accuracy, have them transfer their chain onto strips of construction paper (green for producers and red for consumers) and link them into a physical chain. When all the chains are complete, the class should come together to see if there

are places where the individual chains can be linked together. (For example: One group may have a chain that includes a mouse, which could be linked to a snake in another group's chain.) Use a new color to make the links between chains. Finally, glue/tape many yellow strips together end to end and slide all the chains onto it from the producer end. Close the large yellow strip to form a circle. The yellow represents the sun, which gives energy to the producers. Hang up the web in the classroom.

(NB: I found this idea on a website but can no longer find the address.)